Space Weather Forecast

Issued on Thursday, 29 December 2022 at 01:33 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Minor Geomagnetic Storms later day 1 into day 2 (29th/30th). Chance of Moderate-class X-ray flares throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low over the past 24 hours with occasional Common-class flares, the largest of which was C6.1 flare at 28/0330 UTC from the large sunspot region in the northeast. There are six numbered sunspot groups on the visible disc and one unnumbered region that developed in the southwest during the second half of the UTC day. The two largest regions on the disc have shown little change or perhaps some decay through the period. The region that has been appearing round the southeast horizon is still coming into view, but appears to be of moderate size and complexity. All other regions on the Earth facing disc remain small and simple.

No earth directed CMES were observed in the available imagery during the period, despite some drawn out X-ray signatures.

Solar Wind / Geomagnetic Activity: Solar wind speeds were elevated between 500 and 550 km/s for much of the period but dropped to slightly elevated levels from 28/2100UTC. The total magnetic field strength been weak throughout, with only weak fluctuations in the important north-south component. The solar wind parameters were indicative of a positive coronal hole fast wind, resulting in Quiet to Unsettled (Kp 1-3) geomagnetic activity.

Energetic Particles / Solar Radiation: No solar radiation storms were observed, despite the increase in magnitude of potential generative X-ray flare events.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity carries a daily Chance of Common-class activity. The main contributions to these risks come from the largest group on the visible disc, a sunspot in the northeast, as well as a sunspot in the northwest and a region that is arriving in the southeast. The large group in the northwest is expected to depart the Earth-facing side through the course of Day 2 (30th December).), but this is likely to be counteracted by arrivals from the far side.

Solar Wind / Geomagnetic Activity: Slightly elevated solar winds are expected to become elevated, or perhaps strong, later on day 1 into day 2 (29th/30th December) due to the arrival of a coronal hole fast wind enhancement. This may also be coupled by a glancing blow from a CME that left the Sun on the 25th, although this is low confidence. On day 4 (1st January) solar winds should gradually ease as the coronal hole influence wanes.

Geomagnetic activity is expected to be largely Quiet to Unsettled at first, becoming Unsettled to Active later on day 1 into day 2 (29th and 30th December), with a chance of Minor Geomagnetic Storm intervals, Geomagnetic activity and the risk of Storms should reduce through days 3 and 4 (31st December and 1st January).

Energetic Particles / Solar Radiation: No solar radiation storms are expected, however there is a daily slight chance given the number of large sunspots on the disc and the increased tendency towards Moderate-class X-ray flares.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	40	30	10	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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